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SchoolNet, Africa, and the IDRC

IDRC Study/Acacia Initiative
by John Harker
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Introduction

This paper represents a response to the need of the IDRC for an understanding of Canada's SchoolNet in the context of Acacia, the initiative promoting the application of Information and Communication Technologies for development in sub-Saharan Africa.

The IDRC was interested in a number of questions, among them, just what opportunities and cautions pertain to an IDRC involvement with SchoolNet as a Canadian technology looking for markets in the developing world. The answers were meant to contribute to a comprehensive review of the SchoolNet experience in Canada, on which the IDRC could base future decisions about its relevance for an expanded ACACIA initiative.

Methodology

In completion of this assignment, we were able to mount a Literature search; Internet search; preliminary discussions with SchoolNet representatives; comparative analysis; user study; multiple visits to the SchoolNet site; Usenet discussion group analysis; talks with SchoolNet and IDRC officials; and a trip to South Africa and Mozambique.

Literature, both from SchoolNet and from external sources, has been surveyed, primarily to identify the main issues, as seen both by the orchestrators of SchoolNet and by outside commentators, be they partners, clients or critics. The Internet was also searched for mention of SchoolNet, with much the same purpose.

Additionally, using the Internet we have conducted a survey of what is currently available in the SchoolNet vein, and looked at the extent to which the SchoolNet concept has been developed elsewhere.

We have met with SchoolNet officials, to acquire an understanding of the (changing) concerns

and objectives within the organisations, as well as to establish the direction the organisation sees itself as taking. Central to these discussions were the international role and ambitions of SchoolNet.

The structure and concepts of SchoolNet have been contrasted with those of the ILO's GLADNET, the online forum for the advancement of policies and programmes for disabled people which was developed in Canada(**http://www.gladnet.org**). This has given another example of the networking orientation of SchoolNet, and a better overview of the concepts in the context of the Internet.

We have spoken to educators, teachers and administrators, both those familiar and not with SchoolNet, to find a user perspective of SchoolNet, as well that of prospective users. This has been domestic and international.

We have explored the SchoolNet site to familiarise ourselves with content and presentation, as well as to examine usage. We have also explored the linkages within the SchoolNet environment.

What is SchoolNet?

The future of education is an issue which received careful attention from the Economist, when it celebrated its 150th anniversary in 1993 and looked ahead through the eyes of distinguished thinkers and commentators. Dianne Ravitch, of the Brookings Institution, offered readers her glimpse of education in the future. Speaking of the role of teachers, she foresaw that they would become "coaches and guides who help students manoeuvre their way through the new technologies and the vast array of data bases and teaching programs that will be available".

This is the scenario that serves as the best introduction to SchoolNet; the force tailoring and presenting this array of resources, in a spirit of individual empowerment in the dynamic field of education. And Dianne Ravitch's focus on the role of the teacher is most apposite, as our study of SchoolNet and a trip to Southern Africa both reinforced.

SchoolNet is an Internet interface developed in 1993 to introduce the information highway to Canadian schools.

A network integrating all 16,500 of Canada's elementary and secondary schools, with connections to all the country's libraries and universities, SchoolNet is the contextual hub of a huge educational resource base. One which its architects and managers hope will increase the exposure to information technology of 302,000 teachers in Canada who will have to deal with it effectively to have an empowering impact on more than 4 million pupils. SchoolNet should be viewed in two ways; as an interface to the Internet that relies on resources available, and as a virtual education centre, complete with both method and material for learning. It comprises both elements, in a flexible structure that characterises the Internet generally.

SchoolNet is a step towards self education; developed on the hypothesis that teacher, pupil, and system alike would be best served by the use of technology to astronomically expand the resources available to any and all aspects of education. Technology with the potential for more content, variety, and detail, with more excitement and innovative means of providing the inspiration and enthusiasm on which learning so depends.

Not to mention the possibility of being less costly than an educational system, such as Ontario's, that, in its current state, is not given very good prospects for survival, and is being subject to costly reviews. Also there is the concern that networked computer technology is inexorably the road we are on, and that the education system should reflect this by preparing the young for initiation into a world that is increasingly technological.

A thorough analysis of SchoolNet requires, in the first instance, an understanding of the context in which it operates. As an ICT education system, this context is the Internet, and the World Wide Web. We suggest an approach in the following three parts:

- the nature of the web/Internet, and the context for SchoolNet;
- SchoolNet as a virtual organisation and the concept of distance learning; and
- SchoolNet as integrated educational content.

It is appropriate to begin with the observation that there is abroad a basic misconception about the nature of the Internet and the World Wide Web; a misconception manifest in concerns about competition and market share. SchoolNet is not, strictly speaking, in competition with any other network, Canadian or foreign, for market share, and an analysis centred on "competitiveness" could demonstrate a lack of understanding of what the Web and by inference, the Internet, is all about. This issue will be addressed below.

The nature of the World Wide Web and the Context for SchoolNet

Examination of SchoolNet requires an understanding of the backdrop of the Internet; a multidimensional web of interlinked nodes. Nothing is mutually exclusive in this space of near-infinite pathways and networks, in which SchoolNet is a hub of connections between institutions and individuals, naturally related by the theme of education.

Much in the way a spider's web is spread out, the World Wide Web is a network of documents, accessible on the Internet and linked via hypertext. Hypertext is a way of presenting and relating information, using links to enable the user to navigate the Internet by moving from one location or document to another in a non-sequential manner. The documents that are so linked may,in fact, be housed on computers on opposite sides of the globe. The strength of the Web, and of Web interfaces such as SchoolNet,is in connectivity; the range,speed,and elegance of which are the criteria for the interfaces that provide access to the otherwise formless resources of the Internet. As access provider in an educational context, SchoolNet is unique, with a scope and cohesion that, together, are unmatched.

SchoolNet serves as a meeting place for such disparate groups as the ten provincial ministries of education, Canada's First Nations, community-based initiatives (such as grass roots projects and the community access program), common services (such as the library net), and various subject linkages (humanities, maths and sciences, business, arts, etc). Many of these sites provide hypertext links to other locations outside SchoolNet, including links outside Canada. A case in point is the First Nations home page, which links to fellow First Nation organizations in the United States, and beyond. The fact that these linkages lead the visitor to sites outside SchoolNet (and outside Canada) is not a sign that it is "losing market share", rather, it is an indication that SchoolNet is meeting its mandate by linking Canadians together and in turn linking them to the world.

SchoolNet as a Virtual Organization and the concept of Distance Learning

In addition to being an integrated web site, SchoolNet also has a "human dimension," because it is a virtual organization of the students and teachers who interact through its discussion groups and forums. Essentially an online grouping, frequently under the aegis of common purpose, a virtual organization offers immediate contact amongst users, exempt from constraints of distance.

The ability to communicate very cheaply over any distance is one of, if not the, main benefits of the Internet, and in this instance, SchoolNet can be considered a destination as well as a means of communication. Teachers, students, administrators, and trainers, to name but a few, are all users of these sites established to facilitate discussion and interaction. Students can discuss schoolwork, teachers can discuss teaching methods, and meetings can be organised to collaborate on provision of content to the system; topic and user spectrum are incidental to

the main concern of diversified exposure.

Many virtual "Salons" exist for meetings and discussions, although experience has shown this aspect of SchoolNet, and indeed of other interfaces, such as GLADNET, to be relatively unused. The reasons cited are usually awareness and user friendliness, with methods such as mailings being generally preferable. **Were discussion groups and USENETs to be emphasised in the initial familiarisation and training process, effective use could be made of this very useful aspect of SchoolNet.**

As concerns distance learning, such sites exist in abundance on the Internet. However, they do not exist as an integrated part of a learning system, such as SchoolNet. We consider it important that IDRC understand the importance of this concept as it relates to Project Acacia. In such a context, the small available resource base and diffuse population make distance learning practical. The experiences of rural schools in Canada can serve as comparison in this regard. The use of a centralised, shared resource base expands the constituency of an education programme, and **this would correspond with a distribution schedule establishing regional centres as a first generation network, with subsequent diffusion out from these centres when circumstances permit.**

SchoolNet's value as a distance learning tool is especially evident (and especially relevant to the IDRC concept of a community-based project, respecting local and traditional customs) when examining the First Nations page. In SchoolNet's "First People's Elders Teachings" home page, ICT is being used in support of the learning of traditional culture.

If the IDRC is interested in an excellent overview of distance learning concepts and process, one may be accessed on the web at **http://www.uidaho.edu/evo/distglan.html**

SchoolNet as Integrated Educational content

SchoolNet is a multi-dimensional entity in that it combines the functions of a simple network and an educational curricula producer. Much of the content that comprises SchoolNet exists as a result of the collaboration brought about by SchoolNet, with players such as Education Ministries, professional associations, universities, and so on. As the sum of its component parts, SchoolNet has already become, according to a Financial Post article of April 18, 1996, a major producer and developer of educational content, in addition to applications and services. Other content is external by origin, but internalised through linkage. In Canada, there is momentum towards increased self provision of material, meaning that teachers and students, predominantly in groups, and to a lesser extent administrators, begin to provide the content that they would like to see and use. This aims at ensuring currency, and increased familiarisation, as well as the gradual removal of centralised direction. Programmes are in place to encourage submission of content by teachers, students and classes. While this is good policy in general, it is less immediately important in the context of Acacia, at least on other than an introductory scale for countries other than South Africa.

Currency on the Internet need not be regarded as a determinant concern at this point in Acacia's development, and while the vast majority of content will be non-African, there remain huge stores of resources available to improve education there. **African content can be designed and inputted as part of the familiarisation training, and centres such as university departments would probably be anxious to be involved in preparing web material. Helping them to develop capacity in this area would be a worthwhile undertaking.**

Is SchoolNet unique in Canada?

To examine the SchoolNet experience in terms of comparative analysis with other educational devices competing for "market-share" in Canada might not be the most

appropriate way to proceed. The concepts of uniqueness and competition are of limited coherence given the nature of the information highway, which all but eliminates exclusion, and where the networking of resources produces collaboration.

A number of Canadian "educational" databases exist and have a place on the Internet. These databases are linked to SchoolNet and, within the concept of the Superhighway, are subsumed by it.

However, it should be noted that no other comparable interface exists, either within Canada or internationally. Canadian provincial governments have developed a number of databases (such as CLN in B.C. or ENO in Ontario) which offer, to some degree, overlapping materials, but which also complement the SchoolNet database. No similar format currently exists in the USA, according to a number of educators in various States.

It has proven impossible to find any other complete "SchoolNet" format on the Internet.

Which is not to say that there are no other useful offerings which should be fully examined, and drawn on where appropriate. One is the Global SchoolNet Foundation, headquartered in California. **(http://www.gsn.org/gsn/gsn/index.html)**

This aims at supporting low cost, community based, electronic data communications networks that provide all citizens equitable access to the basic information tools. Further reference will be made to it in the course of this paper, and extracts from its Web Page are presented in an Appendix.

- SchoolNet is an excellent resource, for two reasons: it facilitates and encourages interaction amongst students and teachers, provoking increased involvement in curriculum development; and it greatly expands the available resource base for the purpose of education.
- It provides access for all schoolchildren to the Internet and the world of telecommunications that will become their natural milieu as they grow up into a technological world. This provides them with basic life skills, not to mention employment-oriented abilities.
- SchoolNet is a combination of content and organisation in that many of the sites have been developed through the partnerships that both comprise and are fostered by SchoolNet, and there are many sites drawn from the huge resources of the Internet and accessible using hypertext links.
- Content is essential, and is ideally installed and updated by users. This is not an imperative where there exists a vast educational software industry providing ample content. This is also an unreasonable expectation in the context that obtains for Acacia. There is no shortage of information on the Internet, though little of it has been developed in Africa as yet. Rather, at least in the short to medium term, the key is the presentation of relevant material through a user friendly interface, minimising the burdens put on new users. **A main issue here is the skill competency of the end user, child or adult, school or system, and this has much relevance when contemplating a similar network for the Acacia Project.**
- Discussion group and UseNet applications suffer under-utilisation due to low comfort and familiarity levels. **Greater use could be made of these aspects of SchoolNet through their being emphasised in initial familiarisation processes.**
- While SchoolNet is the only educational interface network of it's scope, there are others available, but an examination of "competition and market share" is misguided in the context of the Internet.

SchoolNet's direction - According to discussion with SchoolNet officials

Officials involved in the "marketing" of SchoolNet feel that SchoolNet in its short existence has enjoyed unparalleled success as an organization designed to facilitate the use of information

technology in the schools of Canada. Over 7,500 of the country's 16,500 schools are now connected to the Internet, and the SchoolNet Web site averages over 2 million hits per month.

This success, they assert, is now being noted at the international level. An ever increasing number of countries are contacting SchoolNet and are interested in determining how they too might develop an national electronic educational network.

Canada, because of the activities of SchoolNet and its partners, is seen as a global leader in the field of educational networking.

The objectives of the new SchoolNet international program fall within the mandate of Industry Canada and within the objectives of SchoolNet as set out by its Advisory Board. Within this context the objectives have been established as the following:

"To position Canada among the leading nations of the world in the establishment and operation of an international electronic educational network.

Through the provision of international relationships for Canadian students and teachers, make this world a safer place in which to live by way of developing a more globally aware and cooperative approach within learners throughout the world.

Through the provision of international learning relationships between Canadian and foreign students contribute to the development of a pool of young Canadians better prepared to lead Canada in the field of international trade relations to provide business opportunities for Canadian companies in the use of information technology in the international educational market."

In pursuit of these objectives, SchoolNet has entered into Memoranda of Understanding with Mexico, Trinidad and Tobago, and New Zealand, and is keen on expanding this list. Terms of the agreements cover aspects such as: joint production of content for users, exchange of technical knowledge, development of opportunities for Canadian firms to develop new markets for, and export, their products, and collaborative projects between schools fostering long term international relations.

Some of the key elements within this framework are set out by SchoolNet's international program as follows:

- What we have found in working with some of our international partners is that equal access in both political and economic paradigms is of fundamental importance to developing countries as they embark on educational networking programs.
- SchoolNet is currently undertaking to initiate a facilitation of exchange and coordination of research in the field of information technology in education in Canada. This would provide us with a national broker of activity in this area that could then take on an international role. In addition, SchoolNet has developed a number of informal training models that are being applied at both national and international levels. SchoolNet is very conscious of the fact that our success has been rooted in the support we have generated at the grassroots level, ie. individual teachers. We have been effective at learning how to relate to the front line practitioners, and our models in this area are sought after internationally.
- In addition, SchoolNet believes that the development of an international education network similar to Canada's own network will be a natural and crucially important evolution for those countries currently undertaking domestic educational networking projects. As such, SchoolNet is currently working in conjunction with the Commonwealth of Learning towards leading that effort, with a proposal tentatively scheduled for presentation at INET '97 in Kuala Lumpur.
- Finally, through our international efforts and joint ventures, SchoolNet expects to develop educational software that supports both the Canadian information technology

sector, and the growth/development of domestic information technology industries.

The SchoolNet focus is thus changing, and "marketing" is increasingly international. The Office for International Partnerships, which provided the input set out above, will focus strongly on "transforming the operating culture of education systems". Training is seen to be a priority, both domestically, (work is nearly complete on the production of a cd-rom on the teacher's use of the Internet, to be distributed to teachers across Canada), and internationally, where training, along with technical support, is becoming a cornerstone of SchoolNet's developing ambitions.

Domestically there is also a focus on on the integration of the provinces, provincial "ownership", and increased appearance of Provincial content on the network.

Future prospects for SchoolNet: where will it be in five years?

SchoolNet today is obviously just beginning to develop, even though the four-year commitment, of $1.6 billion, by Industry Canada, began in 1994.

It coexists within the WWW environment and is dependant on the same variables and considerations that apply to the viability of the Internet itself. Additionally though, with its transformative mission, SchoolNet requires a profile within the educational community that places a more onerous burden on its development, in that it must be current. Otherwise, the community will find other avenues to gather and exchange information. The immediacy of this burden is as a result of the proliferation of ICT tools now accesible to the education community.

If SchoolNet is able to maintain a user friendly approach, (which itself requires continual technological development) and a current database, targeted to user requirements and employing varied appropriate means, then SchoolNet appears to have the ability to "capture" the educational community in terms of being identified as the single best resource to offer Internet interface within that community, though there is no reason why it should be the only access point.

How succesful SchoolNet will be in turning Canadian success into international success remains to be seen, but it is clear that it will be in business for some time, at least throughout the life of the Acacia project and, indeed, it seems probable that it will be a more or less permanent feature of Canada's Information Highway. To the extent that it can build mutually supportive relationships with bodies such as the Commonwealth of Learning and the IDRC, it will be more and more seen as a key element of the global Information Highway.

Qualitative Appraisal

Design, monitoring, and evaluation procedures for development programs and projects are now commonplace, and in most instances, they stress relevance, effectiveness, efficiency, and sustainablity.

Relevance is concerned with the usefulness of the results of a project in meeting the needs of target groups. Effectiveness is concerned with the degree of achievement of the project's objectives and the effect of the project on the target groups. Efficiency is concerned with the use of allocated resources compared to the results obtained, whereas sustainability deals with the durability of the project's effects and impact following the withdrawal of external funds.

It is not a straightforward matter to subject the SchoolNet experience in Canada to any such rigorous process. The nature of the Internet, and by extension, SchoolNet, dictates that the application of usual evaluation criteria may prove misleading.

SchoolNet Successes

The major achievement of SchoolNet has been its creation. The fact that it exists in the form it does is an enormous accomplishment, and **it would be valuable for the leaders of Southern Africa's emerging schools networks to not just understand the offerings of SchoolNet but the effort which gave birth to it.** SchoolNet represents a combined effort by government, educators and the private sector to establish a current device within a technologically demanding environment that is quite simply unique in its approach. It takes advantage of many of the resources of the Internet in a manner that is clearly "user-friendly", and for the most part restricts itself to formats that have been tried and accepted within the context of the information highway.

The criteria for continued success is precisely the same as that which was expressed by its creators. SchoolNet must remain technologically and substantively current. That is, SchoolNet must allow for easy access that makes it worthwhile for the user to "visit" the various sites and devices in terms of meeting whatever needs caused the user to initiate the process. Both factors are critical.

The initial plan for SchoolNet has far been exceeded. The early goal of its pilot phase was to connect 300 schools, but after a year of operation, the goal was re-set at the full 16,500 schools mentioned earlier. In April 1996, some 6,000 had been connected. Now, at the beginning of 1997, the figure is approaching 8,000. The federal government committed to linking all First nations' schools in its jurisdiction to the Internet by the fall of 1996, and this has been accomplished.

SchoolNet Failures

The most apparent "failure" of SchoolNet to date is its under-utilization. SchoolNet officials would probably reject this characterization, pointing to the volume of "hits", visits to their site. But visits alone do not constitute utilization. This is a problem that goes beyond the scope of the SchoolNet concept, in that its relative under-utilization is a reflection of many factors including the skills of educators to take advantage of the resources of SchoolNet, the availability of technology to access the Internet, and the relatively time-consuming methods that currently exist to make effective use of many of the devices of SchoolNet. It should be noted, however, that these same "failures" apply to the entirety of the Internet concept.

We are also inclined to indicate that the emphasis on end users updating the content of SchoolNet themselves, which we have previously said not to be vital in the African context, is currently a drawback to the functioning of the network here in Canada, since many end users do not yet have the technical skills needed to accomplish this. This was underscored by an official from the Ottawa Board of Education. She noted that they have been giving in-service training to teachers on basic Internet skills for the past two years, but that the demand is still very great. So, it appears that many teachers in this major city still lack basic Internet literacy.

That said, as the availability of technology increases, skills will develop to more effectively utilize the resources of SchoolNet.

However, it has been the experience of a number of valuable contacts that such **skills will unfortunately not develop as quickly as necessary, nor in a serendipitous manner. Rather, these must be coaxed along by trained individuals who function as ongoing project coordinators,** until such time as the comfort level amongst the participants becomes very high.

This is because project participants, and particularly teachers, are being asked to fundamentally alter the way in which they go about their daily business--to go, as a SchoolNet official put it, from a Factory model of education to Collaborative Learning model; one

GLADNET official has noted that such paradigm shifts in working habits take three years to fully internalize.

Another issue of concern is that we feel **the IDRC project team must ensure that any user manuals produced in conjunction with the project accurately reflect the technical competencies of those called upon to use them.** For example, the "Content Provider's Manual for the SchoolNet WWW" states (on page 1) "Please note that this document assumes that you have a basic knowledge of the Internet and Web terminology. It does not describe how to write HTML documents..." The manual also suggests that content providers "*adapt*" document contents to the web environment, but it does not explain what a proper adaptation should be.

Such assumptions are unfortunately symptomatic of tasking computer technologists to write end user manuals.

We stand by the assertion that the major achievement of SchoolNet has been its creation, and that it must remain current and user friendly for it to remain relevant. We also re-iterate that it has been "under-utilized", but that this must be nuanced. The 38 SchoolNet USENET news group contained on January 12, 1997 a grand total of 68 messages, many of which were off topic, or were junk mail, posted by get rich quick schemes to thousands of news groups across the Internet (known as spamming - see Appendix). On the other hand, SchoolNet has a usage statistics page which indicates that as of February 1996, the "Gopher" section of the SchoolNet registered more than 2 million connections. Also, a review of the "listserv" pages shows significant traffic (not quantified). These examples demonstrate that end users have differing levels of comfort with the different aspects of SchoolNet, and this reinforces the need for effective specific training.

The key component for SchoolNet, both to maintain relevance and user friendliness and increase use, is training. If Project Acacia is going to use SchoolNet as a prototype or instrument, then the end users (educators and pupils) must, a priori, obtain appropriate training in the use of the Internet and using the Internet in an educational setting. "Learning on the job" is necessary, but not enough. Pivotal to the success of the project will be the comfort level educators in the African insititutions have in using computers and the Internet as part of the educational process. Indeed, this point is valid whether or not Canada's SchoolNet plays any more than a passive (though very useful) part in Project Acacia, and was underscored on a trip to Southern Africa, to which reference will be made later in this report.

With reference to the "under-utilization" of SchoolNet, experience with the ILO GLADNET project can provide some lessons that directly relate to this. When the GLADNET Web site was first set up, one of our associates established for it a discussion forum on disability research. In the 12 months that the forum was online, the more than 150 network members, all research professionals, never once used it.

Our associate could not understand why this was the case, and late in 1996 he altered his approach, and abandoned the discussion forum (akin to the USENET news group) in favour a mailing. The results were quite dramatic. In a 2 month period, there were 34 messages exchanged, a large amount, in view of the small size of the network. He felt that the reasons why the GLADNET forum (and by analogy, the SchoolNet USENET news groups) was not used were due to its passive nature (posting a message did not guarantee it was read, as opposed to the likelihood that an e-mail message will be read by the recipient). He also learned that even amongst highly trained university professors and rehabilitation specialists, knowledge of how to use Internet features apart from e-mail was quite limited.

Something similar has been observed by the organizer of the Western Cape School Network in South Africa:

"Re your analysis of Schoolnet Canada use, you might be interested to know that we find

Usenet newsgroups one of the least-used Internet resources here. I think this is partly because the software is less friendly and accessible than e-mail, and partly because it's a discussion medium that people don't really know about.

Usenet also tends to be characterised by high signal-noise ratios, and most people consider mailing lists more useful forums for group participation, so if SchoolNet Canada runs lists as well as newsgroups, perhaps it might be worthwhile monitoring those for a while."

All this to underline why **we recommend in the strongest terms that the training component of the project receive the highest priority,** a point we will return to.

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IDRC Study/Acacia Initiative
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March 7, 1997

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SchoolNet and Africa

The IDRC is critically aware of how far ahead South Africa is of any other country in sub-Saharan Africa with respect to the status of ICT in educational systems, and it is best to begin with a look at South Africa.

The introduction of the Internet is relatively new to South African schools, and little has been published on its use in the classroom. South Africa has been desribed as the 16th most "wired" country in the world, but, to date, there are only 222 schools in South Africa with Internet access,or less than 1% of the total, and the country is largely missing out on the information revolution.

Recently an effort was made by Gill Summerly (**www.wcape.school.za/za/conrvw96.htm**) to investigate the current use of the Internet in South African schools, and it was decided to use the Internet in conducting the research. E-mail was sent to all 222 schools with listed Internet connections. What follows is an edited account of the research, which ably highlights the current South African situation.

The questionnaire focused on: personal profile of the respondent and their school, general technology information, staff use of the Internet, and pupil use of the Internet.

As large quantities of undelivered mail came back, the researcher queried various regional network co-ordinators and teaching colleagues about e-mail addresses. It emerged that many were no longer valid due to staff changes, but a major gap was found in one province where schools had lost their subsidised "Freenet" connection. At present, schools in this province have no Internet connectivity.

The paucity of response to the questionnaire on the Web, along with a number of e-mailed complaints of lack of access to the Web, made the researcher decide to e-mail the questionnaire to all active e-mail addresses.

Respondents profile

Of the 180 schools e-mailed with copies of the questionnaire, only 35 responded. Of these, 5 were primary, 17 were secondary and 8 were primary through secondary. It would seem that the majority of schools using the Internet are at present secondary schools.

Results revealed that bigger schools provided more computers than smaller schools, but this was tied to the number of pupils enrolled. The computers seem generally to be grouped in a computer laboratory, which could accommodate at least one class at a time. Only 10% of schools had all or a majority of their computers with Internet connectivity, 17% had about half of their computers with Internet connectivity, and the remaining 73% had only one or two computers in the school with Internet links.

The largest percentage of schools (34%) connect to the Internet through a university and Uninet. This was usually through a regional school network, such as WCSN, Pretnet and Gauteng Schools Network. Most frequently this was only an e-mail facility.

Eighty percent of respondents belonged to regional networks - Western Cape Schools Network, Eastern Cape Schools Network, Gauteng Schools Network and Pretoria Schools Network. These networks appear to have given impetus to many schools becoming connected to the Internet, the WCSN being the most active example with approximately 129 member schools. There was a strong feeling from respondents towards a co-operative national network or strong co-operation of regional networks to share ideas, expertise and developments and thus prevent each region "re-inventing the wheel".

Support from the principal and management

Ninety five percent of schools had support for their technology plan and funding, but this figure is misleading due to the discrepancy in Internet provision: the overwhelming majority having only one or two connections.

This would seem to indicate that there is an awareness of the potential of the Internet but as yet there is no vision for ICT to be integrated into the curriculum.

Teachers and ICT

64% of staff in schools were considered computer shy, and 3% of schools felt they had more than half their staff computer literate, while 2/3 of the schools had less than 20% of their staff computer literate. Comments revealed that staff needed intensive exposure to telecommunications and the possibilities of the Internet, but there was a strong feeling that basic computer competency was necessary before they could hope for integration of telecommunication and information technology.

Here, there were so few users that statistics about the type of usage made of the Web by staff are meaningless and general comments must suffice. Of the small group using the WWW, it was interesting to note that it was mostly used for research and secondly for finding new resources.

Most teachers using the WWW had taught themselves, while only 30% had formal training courses or in-service training. If only 30% of these innovative teachers who are introducing the Internet into their schools have had training, it would seem likely that little or no training has been offered to staff generally.

Internet facilities used by pupils

E-mail facilities were available to 100% of pupils in all 30 schools studied, but only 60% of pupils could browse the Web. There are serious problems of hardware and connectivity. A number of the larger schools are government subsidised schools and the funding is just not available for computer networks and hardware.

The use of the Web in schools with access was primarily for curriculum related research; and collaborative projects. Schools with Web access are using the facilities in a range of activities,

from extracurricular use to curricular enrichment.

Analysis of findings

The research findings fell into three main categories, access, use and problems.

Connectivity

Few schools in South Africa have Internet access (about 1%). These schools are heavily concentrated, in descending order, in the four provinces of the Western Cape, Gauteng, Eastern Cape, and Kwa-Zulu Natal. This appears to be due to:

- Strength of the regional school network organisations;
- Availability of Universities which provide backbone network access and network skills;
- Financial provision and "conceptual" support of principals;
- Hardware infrastructure of computer technology in place for computer science and literacy skills;
- One or more staff envisioned by the potential of telecomputing and the Internet;

Schools with access are often limited by poor connectivity and are limited in their ability to provide adequately for teachers and pupils with e-mail and WWW access. With the newer regional networks like Gauteng and the embryonic Kwa-Zulu Natal group of schools, there is a move towards faster dedicated 64kbps lines. Cape schools usually connect via a slower and cheaper 28.8kbps analogue line - all that was available at the time of inception.

Regional school networks routing through universities or other Uninet members provide most of the leased-line connections. The other schools use Internet service providers (ISP) for their Internet and WWW connection, but these are schools with minimal data traffic.

The cost of leased lines from ISP and the associated data traffic, or a dedicated line, is unaffordable for most schools.

Uses

E-mail was the most heavily used facility, but even so, it is obvious that few schools have open access of full e-mail facilities for their entire school campus.

More than half of the teaching staff fell into the category of being computer shy, with information technology seen more as a threat than a tool. But there was a group of pioneers - teachers discovering the benefits of information technology and using the WWW to enrich the curriculum and their professional growth. These educators are computer literate and used the Internet and WWW to gather information, to present information or to communicate with other people.

South African pupils generally would not be using the WWW in the classroom situation in the near future. **(The SchoolNet call to participate in educational Internet-based classroom projects was addressed to every teacher in every school in Canada. The call set out modalities and advice on how to create a project. More than 2,000 are now on file at the SchoolNet web site, and should be used as a resource by South African teachers.)**

In the 1% of schools with Internet connections, only 60% of pupils could browse the WWW. The Web is currently viewed primarily as a source of information for research, for collaborative projects and for free time activities.

Problems

There were serious problems encountered in introducing the Internet into the schools. Twenty

one (70%) of respondents lacked time; 14 (47%) lacked suitable equipment - both hardware and telecommunication links; 11 (36%) of respondents felt colleagues lacked interest and this is understandable with 75% of staff computer shy. Lastly, 11 (36%) respondents felt they lacked know-how; and smaller schools who had facilities for a classroom situation felt they lacked relevant South African material on the Web.

Teachers and pupils need to share information with one another as they find useful sites, and thus limit the time spent aimlessly searching the Web. Lack of time is a serious matter. Staff were not given time for in-service training, nor time for self-development of Internet skills. The lack of the appropriate computer skills or sufficient knowledge about information technology was a problem for both teachers and pupils; only a few schools were embarking on school wide training.

One suggestion is to hire a curriculum support person with the responsibility of finding helpful information for teachers. Perhaps this is possible for the regional school network as part of their service to their members but commitment would need to be high in order to employ someone to help with this process.

The lack of significant use of the Internet in South African schools seems to be due the lack of hardware and connectivity on the one hand and the lack of computer and information technology training of teachers on the other.

Conclusions

The benefits of using the Internet and particularly the WWW would appear to far outweigh the problems that might arise. Teachers using their Internet connection have access to another medium through which to engage pupils in the learning process. The Internet also provides teachers with a resource to establish professional bonds with other teachers and organisations. They are able to exchange lesson plans and ideas, seek advice and debate pedagogy with peers around the globe. For schools with limited resources, the Web expands those resources and allows people to perform research far beyond the limits of their school boundary. It allows sharing of locally produced resources, teaching ideas and lesson plans. Its development for distance learning and in-service training could be valuable in South Africa.

Pupils also benefit from an Internet connection. They will have the opportunity to expose themselves to new ideas and resources. Through publishing their own writings, pupils will become more concerned about the quality of their work as their audience increases and global comment is possible. Publishing information also allows teachers and pupils to become providers of information, as well as consumers of information. This could have great benefit for development of pupils and teachers in rural areas.

The creation of homepages on web sites allows pupils and teachers to learn a variety of new skills. Through collaborative projects, pupils are able to participate in real life, real time events. Pupils can also communicate with people all over the world through establishing key pals and Web pages. All these activities encourage pupils to take a more active role in their own learning process.

Teachers need to prepare themselves in order to guide their pupils in effective use of the Internet. This is a priority if the Internet is to become a viable tool in the school learning situation. As the Internet is a medium to which schoolteachers themselves have only recently been offered access through their schools, training is essential.

(Though the use of Cd-rom's as training material for teachers cannot be justified yet for sub-Saharan Africa, it would be useful for the IDRC to enable teachers and experts there to examine and discuss the version soon to be completed by SchoolNet.)

It is well documented how little in-service training and preparatory support for the influx of

information technology there has been. Training is needed in both the technical field and in dealing with pedagogical concerns. But training, support, and professional development activities only have value when the technical infrastructure is in place.

Access

Access to the Internet is the most important consideration. Without it, nothing else happens. Access often starts with an individual. It just needs a single person in the school to become an Internet "expert" or just be an enthusiastic campaigner, to inform and motivate or inspire colleagues about its potential.

If the Internet is to become important to schools, they need to invest the time and money in setting up a good system. Investment in hardware and connectivity is essential. Once a system is set-up, it takes both time and technical "know-how" to manage it. Hiring a technical support person to be in charge of the network would be helpful, and as this is not always possible, the regional network needs to have technical assistance available at affordable prices.

Access cannot be only for the elite, technology-rich schools, sidelining rural and poor schools. Also, school network service should include most of what is available to the average Internet user on the street. Here business, industry and telecommunications companies should be involved, as schools need reduced-cost network access.

(The Canadian experience may be useful here; collaboration with the Stentor Alliance and other private sector partners has provided low cost, and in many cases, free, Internet access, as well as reduced cost hardware, software, and satellite technology. Stentor's web address is **www.stentor.ca)**

Some schools have formed partnerships with universities and businesses as a way to gain access to Internet accounts or equipment. Through these partnerships, some organisations donate accounts for educational purposes. For those schools who cannot find someone to donate accounts, it would be helpful if local service providers would be willing to offer accounts to schools at reasonable rates.

The teacher's role in helping to solve the problem of access is to become informed and involved. The more a teacher knows about a system, the more he/she will be able to help manage it. The teacher's voice is also important in convincing the regional educational bodies to expend the time and money needed to develop a good system. Access will improve as the popularity of the Internet continues to grow and technology in schools becomes an advantageous place to funnel money so as to equip pupils for the information age in which they must earn a living.

Training and Support

Training and support constitute the second most important aspect to consider. Training for in-service and pre-service teachers is essential. There is also a need for co-ordinated regional and national efforts at designing Internet resources for use in the curriculum.

Provincial or regional departments of education need to establish or at least encourage network support services and staff development programmes. Regional networks need to share technical expertise and encourage the publishing of pertinent resource materials, local lesson plans and useful Web sites for the South African curricula. Then educators can use the online network facility to enrich their teaching.

Universities and teacher training colleges that offer teacher education programmes also need to train teachers how to use the Internet. Institutions, such as universities, can also be available to offer support and become involved in the schools themselves. **(SchoolNet and**

McGill University are collaborating to produce ICT training for teachers.) In addition, people who are experts in the field might be available to help train teachers.

Ongoing in-service training is vital. Many respondents reported teaching themselves or learning from peers as the only training that teachers received. This means that teachers who know something about the Internet are extremely helpful to those teachers who are still learning. If networked information technologies are to become embedded into the curriculum reaching an advanced stage of integrating, then more in-depth workshopping and in-service training is needed in the use and applications of these technologies. Time is also an important factor.

If teachers have the time to sit down, try out the Web and become familiar with it, they will be more likely to seek out ways to use it in the classroom. Along these lines, home access is another way to increase teacher knowledge. If teachers are given access from home they are probably more likely to spend the time needed to become familiar with the Web.

It is extremely important that teachers receive a great deal of support when working with the Internet. Schools need to provide in-service training on the Internet that goes beyond simply introduction. Many teachers need to learn how to use the Internet and once these skills have developed, they will also need help in deciding how to integrate the Internet into their curriculum. For some teachers it may even be necessary to hold an in-service course on how to use a computer. Once regular and stable access to the Internet is worked out, and teachers have a proper system for training and support, the next challenge is managing the vast resources of the Internet. **(By its structure, facilitating this managerial role of the classroom teacher is one of the demonstrated strengths of SchoolNet.)**

Resources need to be useful and meaningful to South African teachers, so that they can be integrated into the curriculum with a long term goal of teachers being able to seamlessly merge the Internet resources into the classroom. Local educational databases of Internet curriculum units need to be gathered and disseminated through regional or national educational networks.

South African teachers need to be suppliers as well as consumers of electronic publishing.

In-service school librarians need to be offered the opportunity to learn how to manage networked information systems. They are in a pivotal position to find and bring resources and services to their fellow teachers.

While much work has been done in other countries to promote access and use of the Internet to schools, a lot still remains to be done in South Africa. The education offered to pupils today will affect their future and the future of this country. Although there is no formula for the application of the Internet to a particular context, or how to integrate the Internet into all school activities, pioneers are working with the Internet in the classroom and countless examples of creative use exist on the Internet for anyone to access.

The quickest and most effective way to learn more about using the Internet in schools is to join a conference, news group, bulletin board, or forum. Through these vehicles, other teachers, educators or specialists in the field pose their own ideas for others to respond to. The Internet allows users to share in the results of others' work, study collaboratively with pupils and peers globally and to explore new possibilities, one small step at a time.

The volume of activities in educational telecommunications has never been higher. Nevertheless, educators need to be innovative in the development of this technology. Developing methods of using the Internet to enrich delivery of education in the classroom is essential. Innovation in education on the Internet involves pushing and developing the facilities and capabilities of every area of the education field. Teachers in South Africa and elsewhere need to examine closely what the Internet is "good for" and develop resources, pedagogy and

the technology to enrich the curriculum and provide for their professional growth. An Internet connection is too costly and hopefully too valuable not to exploit it fully.

Southern Africa: Impressions and Openings

The condensation of Gill Summerley's research effort presented above offers a useful starting point for the presentation of a number of observations, drawn first from the trip to South Africa, and then from the trip to Mozambique, which sits bravely at the other end of the ICT continuum from South Africa.

The IDRC is aware of, and can take some credit for the emergence of, the "National Schools Networking Steering Committee" in South Africa, which has grown out of dedicated efforts in Gauteng (especially the Pretoria area) and the Western Cape. In its proposal to the IDRC for assistance in fashioning and implementing a Schools Network and Internet Development Programme, the Steering Committee states from the outset that the form of a national co-ordinating structure is influenced by the model adopted by Canada in the form of Canada's SchoolNet, and the lack of provincial capacity in South Africa at present: in point of fact, there is little awareness in South Africa of the primacy which Canada's SchoolNet is placing on the "provincial" ownership of and involvement in SchoolNet.

Indeed, during a trip to South Africa in late January/early February, 1997, we found very little awareness of just what SchoolNet is or can offer. One key actor had been involved in the video-conferencing link between a Johannesburg school and one in Nova Scotia, organised by SchoolNet with assistance from Stentor, but in each school visited, where it was clear that there was enthusiasm for e-mail connections with the outside world, very rarely was Canada prominent, let alone SchoolNet. And, as Gill Summerley's research underscores, the e-mail system is looked on as the first great objective. **Here it is worth noting that pupils and teachers were interested in acquiring e-mail addresses. It would be worthwhile for those with access to consult the SchoolNet site,** http://www.schoolnet.ca, **and join the SchoolNet WhitePages, which have such addresses.**

There was much more mention of Australia, and this appears to have been occasioned by that country initiating an e-mail project, out of which South African children have the chance of visiting Australia.

There was also interest in a program currently offered through the Global Schoolnet Foundation, "Where on the Globe is Roger?". This is held to stimulate the pupils to want to use the e-mail facility, and it has the advantage of tying into the desire of the pupils to acquire "penpals". Actually, it has developed a Peace Pals project, in the hope that "thoughtful students worldwide can promote their own views of peace on the World Wide Web for everyone to share."

Each teacher encountered on this trip felt that the pupils were responding well to whatever opportunity they were offered, and were growing in their familiarity with and vision for information and communication technology. This was true irrespective of the state of access, and gives great hope to all concerned. Hope is what presently sustains some of the teachers in the deprived schools, and it is hard not to conclude that whilst **Canada's SchoolNet must appear to such people as a dream beyond reach, the system constitutes such a mine of useful services and programmes that in addition to assisting in the achievement of a series of reasonable goals, it would be a pity if the visionaries and doers in South Africa where not able to become familiar not just with the SchoolNet web site but also with the ways in which Industry Canada might be willing to share the riches of this site with South Africa.** Information about provincial as opposed to national engagement is a case in point.

This can be accomplished, given the emergence of the National Schools Network Steering Committee and its highly-motivated and very practical actors.

The first visit was to an elite boys school, where in 1996 SchoolNet, assisted by the Stentor corporation, set up a video link with a school in Nova Scotia. The teacher who runs the computer lab is Chair of the Gauteng Schools Network and the National Steering Committee. He is also a businessman, keen to discover new products and services to promote in the computer and software fields. He has introduced Microsoft computer courses to the school for post-matriculants, which he sells in order to finance the operations of his computer lab. It is well equipped, but does not seem to share with less privileged schools in the area. The teacher is a key player in the national effort to build a SchoolNet, and has already had a major impact on events.

The visit confirmed what has been noted by Gill Summerley, that it is basically the expensive schools for the elite, irrespective of colour, which are firmly on the Web, and not the "grass roots schools" which the IDRC is anxious to reach.

The next visit was to a cell-phone provider, which would have been difficult to understand in Canada, but with so few places being able to connect by lines in the rural areas, a lot of work is underway on the use of cell phones to hook up to the Web, and this was demonstrated later.

The company, Vodacom, was clearly anxious to help the IDRC understand what can be provided, by cellular technology, and was open to discussion about "sponsorship" of projects aimed at enhancing the connectivity of schools in rural areas. With a number of Canadian communities being isolated, it is not inappropriate to wonder if cell phones as a link in the Internet chain have a role to play in Canada as well as in South Africa.

The next stop was a poor school, serving 1355 students in a deprived area, Langa township. It had, however, a computer lab, a dedicated teacher, and a commitment to helping places even worse off. The teacher, a former political prisoner who had first encountered the world of computers while in detention, is determined to ensure that his lab, and his enthusiasm, are firmly grounded in the community.

To this end, he offers training for the teaching and administrative staffs of other local schools in Langa and Kyalitsha townships. This is provided free of charge, as everyone is disadvantaged, and cannot afford to pay.

Though the lab has a good number of machines, only one of them, a Pentium they secured by lobbying the Deputy Minister of Trade and Industry, is connected to the Internet. When it is on line, the computer is hooked up to a television set so that the whole class can see what is going on.

The lab has so far been maintained with the help of donors, and the initial start-up owed much to the local Technical College, a former IBM subsidiary, and the Computer Society. **SchoolNet's web site contains useful information on the issue of private sector support, listing many firms which have shown a willingness to work with schools on computerisation.**

The visit to the Cape Town area was organised by the driver behind the Western Cape Schools Network, who

worked closely with the teacher in Langa and with others such as the Director of Education Technology for the Western Cape Education Department, and the computer staff at Pinelands, a rather exclusive boys school, again very well equipped. Here it was learned that the staff are connected to the poor school in Langa--and trying to help it get ICT resources.

Pinelands sported a wall-chart showing locations around the world with which e-mail contact had been made. Most indicator pins were placed in the US, and only one in Canada.

The school had loaned a PC to one bright (black) boy who used it to write and save to disk his e-mail at home for transmission at school. The teachers commented on the enthusiasm of the children, but it is worth noting that a provincial government education official observed (as Gill Summerley pointed out) that teachers themselves were not yet using e-mail as much as they should. Teacher Training did not yet reflect a focus on any aspect of ICT, though the government runs Teacher Centres across the province, and each has advisors who should be encouraging familiarity with ICT.

It is not impossible to imagine that familiarity on the part of teachers will be forced by the enthusiasm of the pupils as much as enabled by government. A visit to Prestige College, a black school in the countryside north of Pretoria, in the company of the founder of the Pretoria Schools Network, revealed a school filled with pupils keen on the Internet--even though the essential medium in the school was e-mail. There were plans, voiced by the children themselves, to work co-operatively with schools less well equipped than themselves.

Interestingly, this school has a link with a rich, former white, boys school in Pretoria, which provides a link to Prestige College using radio technology. A similar system was in use in a Computer centre in Mamelodi township, where the emphasis was on preparing adults for the workplace, and the centre had little difficulty in attracting students willing to pay R350 for an 8-week course using the computers.

Adults and children, newcomers and veterans, it is obvious that whatever the shortages and shortcomings, South Africa will be well served by a growing corpus of adherents to the benefits of ICT in Education and Training, and many of the most innovative of these are putting their energies behind the National Schools Network Steering Committee.

No grouping comparable to this exists as yet in Mozambique, and probably not elsewhere in Sub-Saharan Africa. Mozambique in only now emerging from 30 years of civil war and the stifling embrace of a one-party state with a command-view of its relationship to society.

No schools were visited in Mozambique,though the discussions which took place at the workshop organized by the university with help from the IDRC had a lot to say about schools, ICT, and the Information highway.

In the working group which focused on Education, a very useful interlocutor was a Math professor at the Informatics Centre of the Eduardo Mondlane University, who was determined to see the IDRC assist with a project, elaborated at the workshop, to put computers into ten schools in Mozambique, one in each province. She also wanted a project to overcome illiteracy, especially among girls, and to help youth prepare for the job market. On being told that only one project could be entertained at this time, she stressed that the computers would have to be capable of handling these issues, not just providing a Web link, and **this made a great deal of sense in the circumstances of Mozambique.**

It points to the value of avoiding a separation of school and community, of embracing multi-purpose solutions whenever possible.

Also participating in the workshop was the Mozambican assistant to the British Council Director in Maputo: everyone is hungry to learn English, and the British Council is busy trying to meet the demand. Various methods are in use, but not yet Computer-Based-Learning, though the British Council and the Australian government have embarked on a project to use the Internet to change perceptions in both countries about the other.

The ground is fertile for a major effort to put Mozambique on the Information highway, and virtually any steps to do so, at whatever level of technological advance, would have an impact on the "grass roots", particularly outside of Maputo, but correspondingly, with so little infrastructure, physical or human, available in the country, any step could seem like a daunting

risk.

In this, much of sub-Saharan Africa must approximate Mozambique, rather than South Africa. But this is not yet a documented fact, and **there does appear to be room for an ICT Audit of the region, which would, of course, be a major undertaking.**

This would seem to us to be the kind of activity which Canada's SchoolNet, which prides itself on its ability to work with and attract the private sector, should play a key part in. **It could do so as a member of a consortium which could involve the IDRC, as lead agency, the Steering Committee mentioned earlier, a Canadian and a South African private company, and some selected schools across the region and in Canada: an element of the Audit could be a project designed by the children, and using e-mail.**

SchoolNet is interested in "marketing" to the region, which it does not, at this time, have a very great understanding of, and nor do many educators and decision makers in the region have much awareness of SchoolNet. Both would be addressed through SchoolNet participation in an Audit of Connectivity, Access, and Training, key considerations emphasised by Gill Summerly and echoed in both South Africa and Mozambique.

Where to Go From Here?

The two key aspects as concerns ACACIA are access and training.

With access, questions are raised about the nature of the Internet and its accessibility, and the nature of SchoolNet and its accessibility, as well about potential costs.

As a Net tool, access to SchoolNet must be universal, unless prohibited by the use of passkeys, as simple access to the Internet also means access to the SchoolNet database. This has ramifications for the possible licensing and distribution of SchoolNet as a service, including questions of what can be sold and what can be withheld.

SchoolNet officials are conscious of the fact that there have been serious costs associated with some of the "products", such as search engines, available on their Web site, and there is a desire to at least recoup these costs. It is recognized that anyone with connectivity can access the site, but if a given country wanted to "adopt" it as its own, then some form of payment should be made.

Mention has been made by SchoolNet of the concept of "intellectual Property", and while this is still a grey area, it appears that the first step towards extending copyright legislation and performing rights into cyberspace has been taken by the WIPO. In December 1996, it held a Diplomatic Conference, attended by more than 100 governments, on "Certain Copyright and neighbouring Rights Questions". The issues are far from being decided, and material about the conference can be accessed at **www.wipo.org/eng.**

The other key is training. This is a tool that requires a concerted investment in training to ensure it becomes incorporated into the learning culture and thus self propagating. Training in the use of the Information highway is still a strong requirement in our relatively computer-saturated society, and is more so in the context of ACACIA.

SchoolNet officials recognize this requirement, and have prominently included training in their distribution package (though their training materials presuppose some Internet familiarity). As mentioned earlier, a university has been encouraged to focus on such training, and some course modules have been developed. We are unable to comment on how these are being used at this early stage.

The researching of this paper has uncovered several important questions and key issues, training certainly among them. What follows is a brief summary of those points we see as

being important considerations for the success of the ACACIA intiative.

- What is the current state of technology, what are the realistic prospects for upgrading, what are the costs of such, and who will be in a position to bear those costs?
- What is the scope of the connectivity effort in Africa? Is the goal as grass roots as possible, or is it best focused on the centres of excellence, with subsequent dissemination as a longer term objective. In the Canadian context, the involvement of the Grassroots level is imperative to the usefulness of SchoolNet.
- How long term is the commitment? both on the part of the IDRC and the hosts. Also how to commit private sector investment, which usually means selling something?
- Given the nature of the Internet, and the issue of access, what are the benefits of a duplication of the SchoolNet model, when the original structure is already available, and can be adapted and complemented piecemeal?

We are mindful of the fact that SchoolNet staff are very keen for their operation to become an integral element of Canadian foreign and development (plus trade?) policy, and they appear to see their future role as leaders in the building of Canadian consortia whereby the public and private sector will collaborate to help targeted countries overhaul systems of education to place them on the "Information highway". **The Director of the new Office of International Partnerships says he wants to meet with the IDRC soon to discuss this idea, and this should be followed up.**

IDRC Considerations Relating to the Development of Acacia

Obvious is the need for training. Related and possibly more significant is the existence or otherwise of a culture of computer use. People need to feel comfortable with this as an educational benefit, which is harder when computers are not a part of their culture, as they are becoming in Canada.

A major donation, or even purchase, of computers, fibre optics and instruction manuals will do no good unless the whole program can be internalised; which requires updating, training, and funding. This can, of course,be influenced in large part by the initial impulse. That is, while big may not work, really really big might, although it is not simply size that counts.

A primary consideration with respect to SchoolNet must relate to its cost-effectiveness. A SchoolNet format requires significant expenditure on technology, from computers to telephone lines and exchanges, and even cellular systems.

Additionally, the purchase of this technology may not have the desired benefits for many years, in that the skills acquired may not have a meaningful application in the community at large.

It may be reasonably argued that when considering the long-term nature of education, the short term benefits of a SchoolNet interface and database do not support the financial commitment required. But it is not clear just what this commitment would be, at least in terms of the SchoolNet system rather than hardware and other software costs.

Whether it is a cost effective plan in the long run is a viable question, and a complicated one. Playing with modern technology is a costly endeavour, and **IDRC should not want to continue upgrading systems if it is faced with a situation of half-hearted support.** If SchoolNet would have only five or ten years of real life in Africa before dying of neglect and lack of local interest, then there are surely other cheaper and more self sustainable options.

Thus, prospects for buy-in must be a major concern. And not just among local, host, partners. SchoolNet is very much partnership-based, and is now working with the Commonwealth of Learning, as an example, which could increase the profile and durability of SchoolNet and ICT's throughout much of Africa.

Moreover, another and compelling argument is that the failure to develop SchoolNet-like formats, that encourage the development of a technological society, will result in the failure of the society concerned to keep pace with the international community. The long term requirements are such that any delays with respect to the development of these resources will simply further exacerbate the problems already apparent in terms of development; these are the very problems which ACACIA has been designed to address.

Further to the observation concerning cost-effectiveness, it is best to note that these considerations are difficult to measure in a technological environment that is changing as rapidly as Internet connectivity.

In considering how determinedly to proceed with this project, the IDRC should be counselled that Internet connectivity on the African continent appears set to expand exponentially. In an online article, "Third-World Internet" (Internet World Online, November 1996) the author David Zgodzinski, a freelance writer based in Montreal, indicates that Africa has the lowest "teledensity" in the world.

However, in 1995, AT&T and Alcatel began a project, "Africa One" which will see the entire continent surrounded by an undersea cable, connecting all the coastal areas. In a second phase, all countries will be connected in a regional network. Finally, the continent will be linked to the rest of the world. When the project is completed, 35,000 km of fibre-optic cable connecting 41 African nations will handle traffic at 2.5 gigabits per second. The author notes that, pending financing arrangements, the project is scheduled for completion in 1999.

While this project will go a long way towards upgrading the Internet server connectivity, the problem of an antiquated continent-wide phone system will remain, and this is the kind of challenge in which Canadian companies might show an interest in, especially if, like Stentor, they are getting more familiar with the broad practical implications of the Information highway through partnership in SchoolNet.

Of course, the failure to develop SchoolNet-like formats will result in the failure of the region to keep pace. That said, there is no choice: a project such as this must proceed. However, given the infrastructure limitations in Africa, **it is clear that a goal of connecting every school, as in Canada, is beyond the current and contemplated capabilities of all of the countries where the Project would function.**

Moreover, such a goal is not necessarily appropriate. The objective of Acacia is to help ensure that Africa not fall irreparably behind. This goal does not require, initially, a mass hook-up. As such, **the project might better concentrate on identifying individual institutions (centres of excellence) that would be connected to the network;** additional institutions would come on stream as the infrastructure permitted. Not only would this approach be cost effective, it would not, as other approaches might, raise expectations to unrealistic levels.

What are these expectations? To some extent, they are determined by the seekers' knowledge of what might be available. Initially, in its first preparations to explore what SchoolNet may or may not have to offer African teacher/trainers, students and educational administrators, the IDRC contemplated bringing Africans to Canada from a range of countries. Their purpose would have been to see SchoolNet operating in a range of settings - urban and rural schools, challenging settings, isolated communities.

This, we feel, would be a very valuable project to implement, though to get the best value from it, the visitors should first be familiarised with the SchoolNet web site, perhaps in the following manner.

ROSA, WARO, and EARO could select the participants and have them gather in Johannesburg, where, with the assistance of the National Schools Network Steering

Committee, the group would spend two days examining the SchoolNet site and discussing what aspects of it hold particular appeal.

As they will discover, the SchoolNet site is, as we have said, a mine of information, where training models and tools co-habit with programmes on learning through email and the results of classroom Internet projects.

Mention once again of training, the inescapable need, prompts a further suggestion. **Just as a "Connectivity Audit" should be undertaken, so should an audit of Training - of current and potential points of delivery as well as need.**

Such a Training Audit could well call on the engagement of SchoolNet itself: Industry Canada has deliberately chosen the partnership route, encouraging not just schools, schoolboards and provincial authorities, but also corporations, parent groups, and teachers' organisations. The most significant of these, the Canadian Teachers Federation, has for many years mounted a CIDA-funded programme of technical cooperation, under which Canadian teachers have devoted their summer vacations to assisting teachers in developing countries.

The CTF could help select a group of teachers who were active users of SchoolNet to provide some of the "auditors". In addition, advantage could be taken of the Youth Internship programmes relaunched by the Federal Government and highly touted by Industry Canada and its Minister.

The audit could, of course, be designed to utilise aspects of Canada's SchoolNet, which is indeed that versatile for equipped and familiar users. SchoolNet does want to "market" in Africa, and while the IDRC cannot assist this at the expense of its commitment to rigor and objectivity, it could in the manner outlined above act in partnership with SchoolNet. This would likely be appreciated by SchoolNet as it would sharpen its understanding of the market it wishes to penetrate.

And an engagement of this kind would not constitute pressure on the countries of sub-Saharan Africa.

These are currently under siege from sales representatives pushing a range of products and technologies.

More than one South African teacher and Internet activist has voiced regret at the weakness of domestic capability to properly evaluate these offerings.

In 1996, SchoolNet was visited by the National Council on Educational Technology from the United Kingdom. NCET researches and evaluates the relevance of new technologies to enhance learning and raise standards in teaching and learning. It prompts and supports the effective use of appropriate technologies across all sectors of education.

The IDRC could keep this example in mind as it seeks to strengthen capacities in sub-Saharan Africa: connectivity and training are priorities, but evaluation must be given serious treatment. With its growing engagement with the drive towards the information highway being mounted by a number of countries, **SchoolNet could be a useful source of intelligence and judgement on this front also.**

It is very broad and useful. It cannot answer everyone's needs, but it can be an important resource for the IDRC, and should be approached in this light.

Submitted by Harker associates, February 14, 1997

SchoolNet, Africa, and the IDRC

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